

WHAT IS CLAIMED IS:

1. Apparatus for facilitating enhanced interaction of vapor and liquid passing in counter-current flow through a process tower having a wall and having at least one tray supported therein which has a tray inlet area and a tray outlet area, said apparatus comprising:

a downcomer disposed above said at least one tray;

said downcomer being formed between a wall region and the wall of said process tower and having an outlet for the flow of liquid therefrom; and

said downcomer outlet disposed above said tray inlet area, said downcomer outlet being formed by the lower edge of the wall region and the wall of said process tower and having a center and opposing end portions with the lower edge of the wall region being closer to the wall of said process tower at the center than at the opposing end portions so that more liquid flows through the opposing end portions of the downcomer outlet than through the center of the downcomer outlet thereby providing substantially uniform flow of liquid across said tray.

2. The apparatus as set forth in claim 1, wherein said wall region includes semi-conical walls that taper to said downcomer outlet.

3. The apparatus as set forth in claim 1, wherein said lower edge of the wall region comprises a smooth curved edge.

4. The apparatus as set forth in claim 1, wherein said lower edge of the wall region comprises multiple straight lines connected end-to-end.

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5. Apparatus for facilitating enhanced interaction of vapor and liquid passing in counter-current flow through a process tower having a wall and having at least one tray supported therein which has a tray inlet area and a tray outlet area, said apparatus comprising:

a downcomer disposed above said at least one tray;

said downcomer being formed between a wall region and the wall of said process tower and having an outlet for the flow of liquid therefrom;

said downcomer outlet disposed above said tray inlet area, said downcomer outlet being formed by the lower edge of the wall region and the wall of said process tower and having a center and opposing end portions;

a discharge plate disposed across said downcomer outlet, said discharge plate having a center and opposing end portions; and

said discharge plate having a predetermined number of apertures formed therethrough, said apertures being formed of such a size and spacing between the apertures that more liquid flows into the tray inlet area through the apertures formed in the opposing end portions of the discharge plate than through the center of the

discharge plate thereby providing a uniform flow of liquid across said tray.

6. The apparatus as set forth in claim 5, wherein said wall region includes semi-conical walls that taper to said downcomer outlet.

7. The apparatus as set forth in claim 5, wherein said lower edge of the wall region comprises a smooth curved edge.

8. The apparatus as set forth in claim 5, wherein said lower edge of the wall region comprises multiple straight lines connected end-to-end.

9. A method of mixing a gas with a liquid discharged from a downcomer onto a tray in a chemical process tower, the method comprising the steps of:

supporting the tray in the process column with a tray support below a tray support region of the tray;

forming a downcomer between a wall region and a wall of the chemical process tower;

forming a downcomer outlet between the lower edge of the wall region and the wall of the chemical process tower with said downcomer outlet having a center and opposing end portions with the lower edge of the wall region being closer to the wall of said chemical process tower at the center than at the opposing end portions so that more liquid would flow through the opposing end portions of the downcomer outlet than through the center of the downcomer outlet; and

positioning the downcomer outlet substantially over said tray support area to define a tray inlet area of the tray so liquid from the downcomer outlet will provide a uniform flow of the liquid across said tray.

10. The method as set forth in claim 9, including the step of forming the wall region with semi-conical walls that taper to said downcomer outlet.

11. The method as set forth in claim 9, including the step of forming the lower edge of the wall region into a smooth curved edge.

12. The method as set forth in claim 9, including the step of forming the lower edge of the wall region into multiple straight lines connected end-to-end.

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13. A method of mixing a gas with a liquid discharged from a downcomer onto a tray in a chemical process tower, the method comprising the steps of:

supporting the tray in the process column with a tray support below a tray support region of the tray;

forming a downcomer between a wall region and a wall of the chemical process tower;

forming a downcomer outlet between the lower edge of the wall region and the wall of the chemical process tower with said downcomer outlet having a center and opposing end portions;

forming a discharge plate across said downcomer outlet with said discharge plate having a center and opposing end portions;

forming a predetermined number of apertures through said discharge plate with said apertures being formed of such a size and spacing between the apertures that more liquid would flow through the apertures formed in the opposing end portions of the discharge plate than through the center of the discharge plate; and

positioning the discharge plate substantially over said tray support area to define a tray inlet area of the tray so liquid from the downcomer outlet will provide a uniform flow of the liquid across said tray.

14. The method as set forth in claim 13, including the step of forming the wall region with semi-conical walls that taper to said downcomer outlet.

15. The method as set forth in claim 13, including the step of forming the lower edge of the wall region into a smooth curved edge.

16. The method as set forth in claim 13, including the step of forming the lower edge of the wall region into multiple straight lines connected end-to-end.

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